| Web Apps & Components |
| :---: |
| Application Server |
| VM |
| Operating System |
| Hardware |

| Desktop Apps |
| :---: |
| Operating System |
| Hardware |

**1990**

**FIG. 1A**

**Today**

**FIG. 1B**

WAS
200

206   206

206   206

206

HTTP Server
204

206   206

206   206

206

DB2-UDB
202

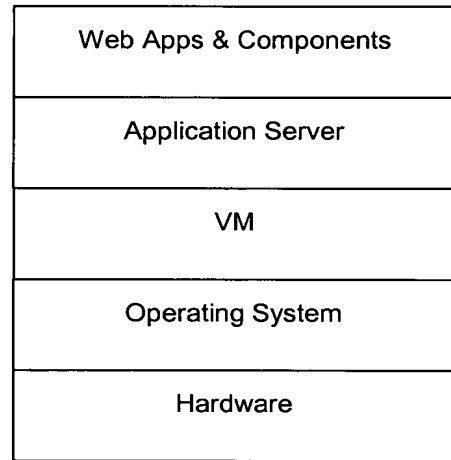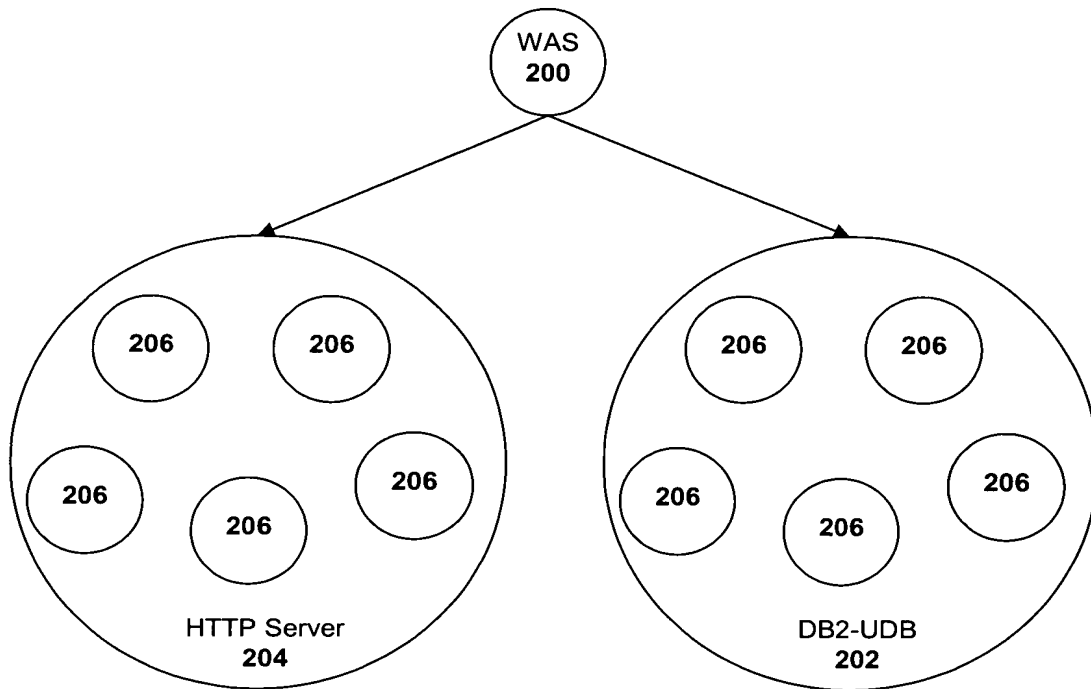**FIG. 2**

```
SystemOut    O ADMA6010I: The tasks are
[com.ibm.ws.management.application.task.ExtractionTask,
com.ibm.ws.management.application.task.CompileJspTask,
com.ibm.ws.management.application.task.ConfigureTask,
com.ibm.ws.management.application.task.BackupAppTask]
[4/7/03 10:31:46:171 EDT] 3ccab45e SystemOut    O ADMA6013I: Extract application binaries
at C:\DOCUME~1\sadtler\LOCALS~1\Temp\app_f4688a2b10\ear
[4/7/03 10:31:47:522 EDT] 3ccab45e SystemOut    O Compiling jsps in Database_Testing.war
[4/7/03 10:31:47:522 EDT] 3ccab45e SystemOut    O Invoking compilation ..
[4/7/03 10:31:49:746 EDT] 3ccab45e WebGroup     I SRVE0180I: [OnlineCatalog]
[/OnlineCatalog] [Servlet.LOG]:
[4/7/03 10:31:50:146 EDT] 3ccab45e WebGroup     I SRVE0180I: [OnlineCatalog]
[/OnlineCatalog] [Servlet.LOG]:
[4/7/03 10:31:53:131 EDT] 3ccab45e SystemOut    O Errors compiling jsps in
C:\DOCUME~1\sadtler\LOCALS~1\Temp\app_f4688a2b10\ear\Database_Testing.war
[4/7/03 10:31:53:131 EDT] 3ccab45e SystemOut    O Return code from jsp-compilation is: 1
[4/7/03 10:31:54:302 EDT] 3ccab45e SystemOut    O Exception in jsp compile:
com.ibm.websphere.management.exception.AdminException: ADMA0021E: Error in compiling jsps -
Database_Testing.war (rc=1)
[4/7/03 10:31:54:703 EDT] 3ccab45e SystemOut    O ADMA6012I: Exception in run
com.ibm.websphere.management.exception.AdminException: ADMA0021E: Error in compiling jsps -
Database_Testing.war (rc=1)
[4/7/03 10:31:54:703 EDT] 3ccab45e SystemOut    O Exception:
com.ibm.websphere.management.exception.AdminException: ADMA0021E: Error in compiling jsps -
Database_Testing.war (rc=1)
[4/7/03 10:31:54:703 EDT] 3ccab45e SystemOut    O ADMA6011I: Deleting directory tree
C:\DOCUME~1\sadtler\LOCALS~1\Temp\app_f4688a2b10
```
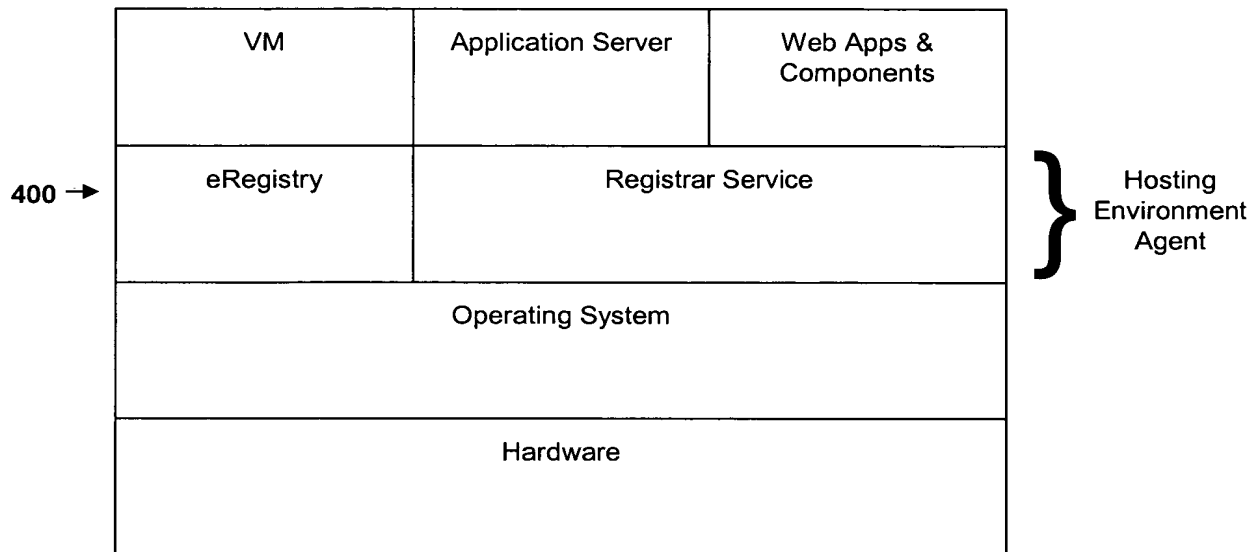
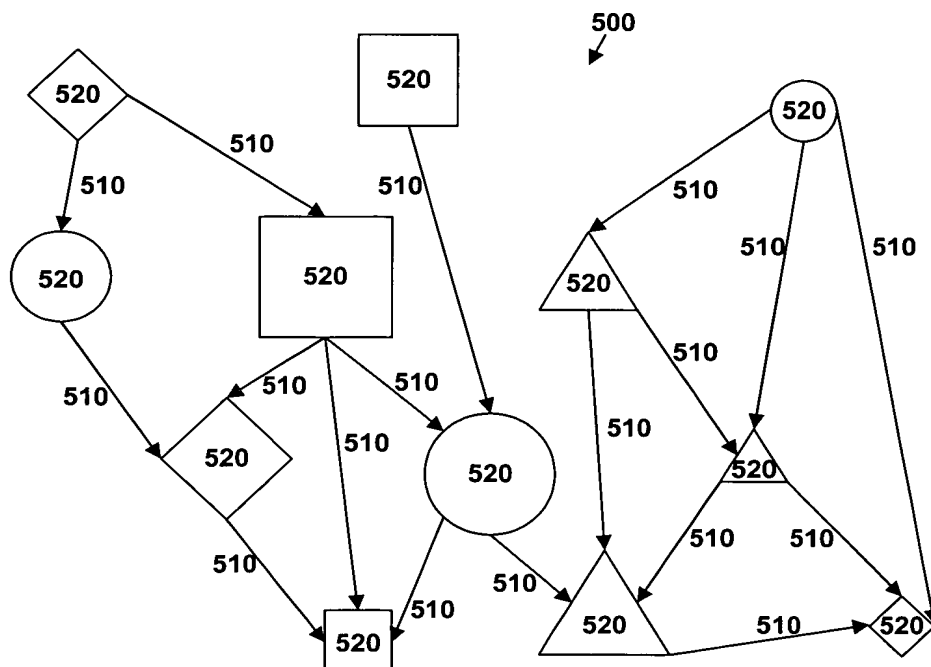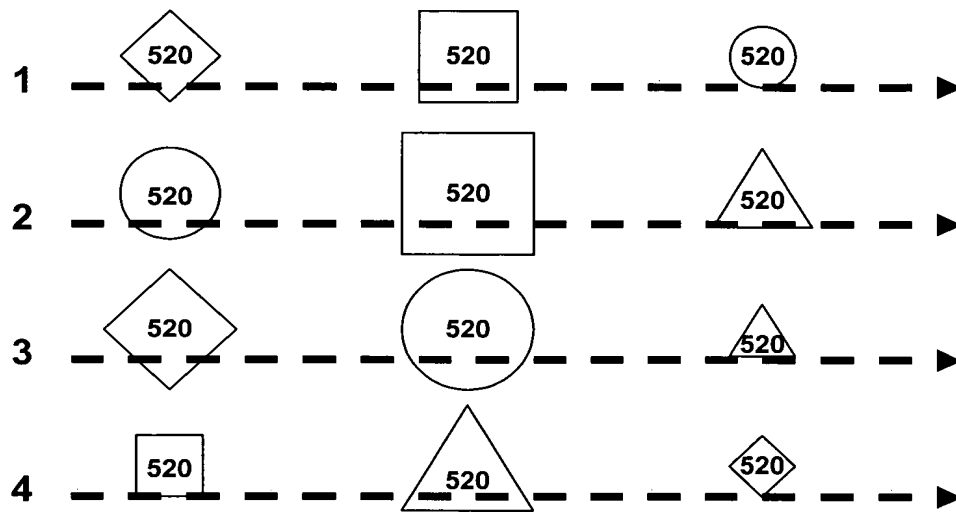| VM | Application Server | Web Apps & Components |
|---|---|---|
| eRegistry | Registrar Service | |
| Operating System | | |
| Hardware | | |

400 →

} Hosting Environment Agent
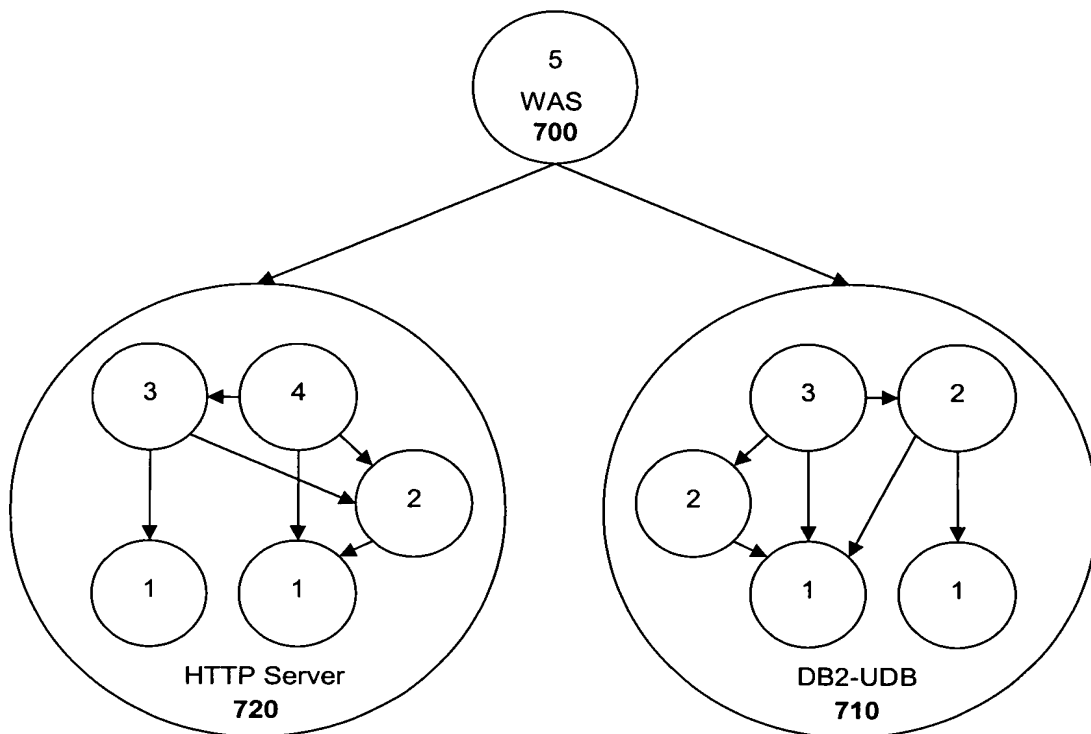
**FIG. 4**

**FIG. 5**

**FIG. 6**



**FIG. 7**

**INPUT:** a DAG representing the semantic model of the software components
**OUTPUT:** void
**do while**(there are nodes unmarked)
       // a leaf node is a node with incoming edges only
       **if** (there are leaf node)
              Nodes_to_install_in_parallel ← leaf nodes
       **else**
              Nodes_to_install_in_parallel ← chose randomly a node at the lowest level in the DAG

       Install(Nodes_to_install_in_parallel)

       Delete the install nodes and their incoming edges ()
**enddo**

**FIG. 8**

```
-- WAS
      -- IBM HTTP SERVER
            + CHECKS
            + DEPLOY
            + SETUP
            + CLEAN UP

      + IBM DB2 UDB

      -- APPLICATION SERVER
            + WAS
            + SERVER PLUG-INS
            + APPLICATION ASSEMBLY AND DEPLOYMENT TOOL
            + DEPLOYMENT TOOL
            + APPLICATION SERVER EXAMPLES
            + MESSAGE DRIVEN BEAN SAMPLES
            + ANT UTILITIES

      -- ADMINISTRATIVE TOOLS
            + ADMINISTRATION CONSOLE
            + ADMIN SCRIPTING
```

**FIG. 9A**

```
-- WAS
     -- IBM HTTP SERVER
          -- CHECKS
                    -- Check memory  OK
                    -- Check Disk Space OK
                    -- Check CPU OK
                    -- Check Windows OK
                    -- Check Windows Patches OK
          -- DEPLOY
                    -- Create Directory ${install.path}/IBM HTTP Server
                    -- Create Directory ${install.path}/IBM HTTP Server/tmp
                    -- Create Directory ${install.path}/IBM HTTP Server/bin
                    -- Create Directory ${install.path}/IBM HTTP Server/register
                    -- Create Directory ${install.path}/IBM HTTP Server/license
                    -- Create Directory ${install.path}/IBM HTTP Server/samples
                    -- Copy File ${install.from}/setup/server.zip
                                        to ${install.path}/IBM HTTP Server/tmp

                        ...............

          -- SETUP
                    -- Extract ${install.path}/IBM HTTP Server/tmp/server.zip
                    -- Run ${install.path}/ IBM HTTP Server/tmp/setup/install.exe
                        ...............
          -- CLEAN UP
                        ...............


  -- IBM DB2 UDB
                        ...............


  -- APPLICATION SERVER
          -- WAS
                    ...............
          -- SERVER PLUG-INS
                    ...............
          -- APPLICATION ASSEMBLY AND DEPLOYMENT TOOL
                    ...............
          -- DEPLOYMENT TOOL
                    ...............
          -- APPLICATION SERVER EXAMPLES
                    ...............
          -- MESSAGE DRIVEN BEAN SAMPLES
                    ...............
          -- ANT UTILITIES
                    ...............

  -- ADMINISTRATIVE TOOLS
          -- ADMINISTRATION CONSOLE
                    ...............
          -- ADMIN SCRIPTING
                    ...............
```

**FIG. 9B**